IN THE CLAIMS:

1. (currently amended) A method for bonding oxygen in an oxide layer, the method comprising:

depositing an M oxide layer where M is a first element selected from a group including elements chemically defined as a solid and having an oxidation state in a range of +2 to +5;

plasma oxidizing the M oxide layer at a temperature of less than 400° C using a high density (HD) inductively coupled plasma (ICP) source, diffusing oxygen radicals into the M oxide layer; and,

in response to plasma oxidizing the M oxide layer, improving M-oxygen (M-O) bonding in the M oxide layer.

2. canceled

3. (currently amended) The method of claim [[2]] 1 wherein improving M-O bonding in the M oxide layer includes bonding oxygen radicals to element M in the M oxide layer.

4. (original) The method of claim 3 wherein depositing an M oxide layer includes depositing a first M oxide molecule with a first number of bonded oxygen atoms;

wherein bonding oxygen radicals to M atoms in the M oxide layer includes bonding oxygen radicals to the first M oxide molecule; and,

wherein improving M-O bonding in the M oxide layer includes increasing the number of bonded oxygen atoms in the first M oxide molecule to a second number greater than the first number.

5. (original) The method of claim 3 wherein bonding oxygen radicals to M atoms in the M oxide layer includes bonding oxygen radicals to dangling M bonds.

6. (original) The method of claim 3 wherein diffusing excited oxygen radicals into the M oxide layer includes breaking process-induced impurity bonds attached to a first M atom; and,

wherein bonding oxygen radicals to M atoms in the M oxide layer includes bonding oxygen radicals to the first M atom.

7. (currently amended) The method of claim [[2]] <u>1</u> wherein depositing an M oxide layer includes depositing an M oxide molecule with M-O bonds in a non-stoichiometric energy state; and,

wherein improving M-O bonding in the M oxide layer includes converting non-stoichiometric M-O bonds to stoichiometric M-O bonds.

8. canceled

9. (currently amended) The method of claim [[8]] <u>1</u> wherein using an ICP source includes inductively coupling plasma:

in a range of 13.56 to 300 megahertz (MHz) with a power density up to 10 watts per square centimeter (W/cm^2);

at a pressure of up to 500 milliTorr (mTorr);

with a mixture of inert gas and oxygen in a ratio of approximately 10:1 to 200:1; and,

with a total gas flow of approximately 50 to 200 standard cubic centimeters per minute (sccm).

10. (original) The method of claim 9 wherein inductively coupling plasma includes using a low frequency power source at 50 kilohertz (KHz) to 13.56 MHz with a power density of 0.1 to 1.6 W/cm^2.

11. (original) The method of claim 9 wherein inductively coupling plasma with a mixture of inert gas and oxygen includes mixing oxygen with inert gas selected from the group including helium, argon, and krypton.

12. (original) The method of claim 9 wherein depositing an M oxide layer includes depositing an M oxide layer where M is silicon.

13. (original) The method of claim 12 further comprising:

forming a silicon layer; and,

wherein depositing an M oxide layer where M is silicon includes using an HD plasma enhanced chemical vapor deposition (HD-PECVD) process to deposit, overlying the silicon layer, the M oxide layer:

at a temperature of 150° C;

using a radio frequency (RF) power source at 13.56 MHz with a power density of 0.1 to 1.6 W/cm^2;

at a pressure of 10 to 250 mTorr;

with a mixture of SiH_4, N_2O, and N_2 gases in a ratio of 5-25:50-200:10-100; and,

with a refractive index of 1.44;

wherein inductively coupling plasma includes inductively coupling plasma at a temperature of 150° C:

using an RF power source at 13.56 MHz with a power density of 0.1 to 1.6 W/cm^2; and,

at a pressure of 10 to 500 mTorr; and,

wherein improving M-O bonding in the M oxide layer includes increasing the M oxide layer refractive index value to 1.46.

14. (original) The method of claim 13 further comprising:

forming a transparent substrate layer; and,

forming a diffusion barrier overlying the substrate layer and underlying the silicon layer; and,

wherein forming a silicon layer includes forming transistor channel, source, and drain regions in the silicon layer;

wherein using an HD-PECVD process to deposit the M oxide layer includes depositing a gate dielectric layer overlying the silicon layer;

wherein inductively coupling plasma at a temperature of 150° C includes plasma oxidizing the gate dielectric layer; and,

the method further comprising:

forming a gate electrode overlying the gate dielectric layer.

15. (original) The method of claim 14 wherein using the HD-PECVD process to deposit a gate dielectric layer overlying the silicon layer includes depositing a gate dielectric layer with a thickness of 500 angstroms (Å); and,

wherein improving M-O bonding in the M oxide layer includes, in the gate dielectric layer:

decreasing a fixed oxide charge density (N_f) from 26.0 x 10^{11} to 1.8 x 10^{11} per square centimeter (/cm^2);

decreasing an interface trap concentration from 3.5 x 10^{10} to 1.2 x 10^{10} per square centimeter – electron volt (/cm^2 eV);

decreasing a flat band voltage shift (V_{FB}) from -7.5 to -0.8 volts (V);

decreasing a leakage current density (J) from 1.8 x 10^{-7} to 2.6 x 10^{-8} amperes per square centimeter (A/cm^2) at an applied electric field of 2 megavolts per centimeter (MV/cm);

increasing a breakdown field strength (EBD) from 6.8 to 7.2 MV/cm;

increasing an electric field strength (E) associated with a J of 1 x 10^{-8} A/cm^2 from 4.3 to 6.4 MV/ cm; and,

maintaining a bias temperature shift (BTS) of less than 1 V under dual bias (±2 MV/cm) temperature stress at 150° C.

16. (original) The method of claim 13 wherein forming a silicon layer includes forming a layer selected from the group including amorphous silicon, microcrystalline silicon, and polycrystalline silicon.

17. (original) The method of claim 1 wherein depositing an M oxide layer where M is an element selected from a group including elements chemically defined as a solid and having an oxidation state in a range of +2 to +5 includes depositing an M oxide selected from the group including M binary oxides and M multi-component oxides.

18. (original) The method of claim 1 wherein depositing an M oxide layer includes depositing an M oxide layer with a refractive index first value; and,

wherein improving M-O bonding in the M oxide layer includes increasing the refractive index first value.

19. (original) The method of claim 1 wherein depositing an M oxide layer includes depositing an M oxide layer with a leakage current first value; and,

wherein improving M-O bonding in the M oxide layer includes decreasing the leakage current first value.

20. (original) The method of claim 1 wherein plasma oxidizing the M oxide layer at a temperature of less than 400° C includes plasma oxidizing the M oxide layer at a temperature of less than 200° C.

21. (original) The method of claim 20 wherein plasma oxidizing the M oxide layer at a temperature of less than 200° C includes plasma oxidizing the M oxide layer at a temperature of less than 50° C.

22. (original) The method of claim 1 wherein depositing an M oxide layer includes depositing the M oxide layer at temperatures equal to and greater than 400° C.

23. (original) The method of claim 1 wherein depositing an M oxide layer includes depositing the M oxide layer at a temperature less than 400° C.

24. canceled

25. (original) A method for bonding oxygen in an oxide layer, the method comprising:

depositing an M oxide layer where M is an element selected from a group including elements chemically defined as a solid and having an oxidation state in a range of +2 to +5;

plasma oxidizing the M oxide layer at a temperature of less than 400° C using a transmission/transformer coupled plasma source; and,

in response to plasma oxidizing the M oxide layer, improving M-O bonding in the M oxide layer.

26-31. (canceled)

32. (new) A method for bonding oxygen in an oxide layer, the method comprising:

depositing an M oxide layer where M is a first element selected from a group including elements chemically defined as a solid and having an oxidation state in a range of +2 to +5;

plasma oxidizing the M oxide layer at a temperature of less than 50° C using a high density (HD) plasma source; and,

in response to plasma oxidizing the M oxide layer, improving M-oxygen (M-O) bonding in the M oxide layer.

33. (new) A method for bonding oxygen in an oxide layer, the method comprising:

depositing an M oxide layer where M is a first element selected from a group including elements chemically defined as a solid and having an oxidation state in a range of +2 to +5;

plasma oxidizing the M oxide layer at a temperature of less than 400° C using a high density (HD) plasma source selected from the group including electron cyclotron resonance (ECR) plasma sources and cathode-coupled plasma sources; and,

in response to plasma oxidizing the M oxide layer, improving M-oxygen (M-O) bonding in the M oxide layer.